



# LESSONS AND CHALLENGES IN THE PERPAREDNESS AND RESPONSE A RADIOLOGICAL EMERGENCY: CUBAN EXPERIENCE



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## INTRODUCTION

The nuclear safety and the preparedness and response to radiological emergencies were included from the very beginning in the Cuban Law on the use of nuclear energy. The coordination between the relevant authorities to nuclear and radiological emergencies was entrusted to the Civil Defense with the establishment of the Cuban nuclear program. The National Civil Defense Headquarter (EMNDC) is the national coordinating authority of any type of disaster, including nuclear or radiological emergencies. This Authority supports its decision-making on the technical assistance provided by the National Center for Nuclear Safety (NCNS). Cuba's participation in IAEA regional projects has strengthened its arrangements on preparedness and response to nuclear radiological emergencies and has enhanced a comprehensive operational concept with the inclusion of the terrorist threats, natural disasters and nuclear security events. Synergies between radiological emergencies and nuclear security were taken into account to develop the Integrated Nuclear Security Support Plan (INSSP). The current evaluation and prognosis of radiological emergencies involving radioactive material, the so called "dangerous quantities", were included to explain the risk of the Threat Categories in accordance with the requirements of the GS-R-2. Cuba has established a biological dosimetry laboratory which is part of the Latin American Biological Dosimetry Network (LBDNet) for dose assessment in case of emergency. The National Environmental Radiation Monitoring Network (RNVRA) may detect in real time abnormal levels of radioactivity that might be caused by a nuclear accident with transboundary effects.

## NATIONAL REGULATIONS

### Decree-Law No. 207 "On the Use of Nuclear Energy"

#### General Principles

- In Cuba, nuclear energy is used for peaceful purposes to foster the country's economic and social development and in a way that guarantees the fulfillment of the international commitments undertaken by Cuba in the nuclear sphere.
- Non-peaceful uses of any kind, by any individual or legal entity, private or public, or by non-State actors that carry out activities involving nuclear material and radioactive sources without authorization, are prohibited.
- Compliance with the necessary security measures is required by law.
- For the implementation of activities related with the use of nuclear energy an approval is required.
- Activities must be carried out in compliance with the basic principles of radiation protection.
- The need of ensuring proper quality management systems, systems for security and physical protection, registration and accounting and control of nuclear materials.
- The need of providing proper and sufficient information to the public.

### Law 75 "On the National Defence"

- Assigns the National Civil Defense Headquarter, to ensure compliance with civil defense measures for the protection of the public.

### Decree Law 170/97 "On the System of Measures for Civil Defence"

- Establishes the responsibility to EMNDC for organizing, directing and coordinating human and material resources to deal with any type of disaster (including radiological emergencies).

### Resolution 334/2011 "Regulation for Notification and Authorization of Practices"

- Authorizations are issued according to the degree of risk associated with each practice (system for categorization of radioactive sources).
- For all authorizations, a plan to reduce disaster (includes the radiological emergency plan) approved by the competent authority, is required.

### Resolution 64/2000 del CITMA

- Establishes the responsibility to advise NCNS agencies involved in the response to radiological emergencies, coordinating protection measures and safety.

### Joint Resolution CITMA-MINSAP/2001

- Enacted Basic Safety Standards.
- Article 177 ; 194, d): The plans include, among other things, a **description of the methods to evaluate the event and consequences on site and off site.**
- Article 204: (...) **assess the exposure** received by members of the public as a **result of an accident...** ( )

## Regulations

## Threat Assessment

### Threat Categories

- Practices, sources and facilities that might necessitate emergency interventions were grouped into Threat Category, based on the recommendations of the GS-R-2 and the IAEA - EPR METHOD 2003.
- Natural phenomena that can cause radiological emergencies (coincident emergencies) such as: meteorological hazards: tropical cyclones, tornadoes, lightning, extreme summer temperatures and hailstorms; hydrological hazards: tsunamis, floods, flooding from the sea, forest fires and droughts; and geophysical hazards: earthquakes, landslides and sinkholes were included.
- Initial considerations on threat assessment of illicit trafficking of radioactive material prepared by MININT, NCNS and customs were included as well.
- Border-crossing points operating major cargo traffic in the country were identified (to establish priorities).

## PREPAREDNESS AND RESPONSE TO RADIOLOGICAL EMERGENCIES : MAIN RESULTS

## Planning for response

### Guidelines for preparing the radiological emergency plan

- General Principles
- It sets the content of the radiological emergency response plans.
- It establishes that the Radiological Emergency Response Plan makes up the response actions of the Disaster Reduction Plan of the organization.
- Exercises should be carried out every two years and a general exercise every four years to test the plan.
- It sets the criteria for the classification of radiological emergency situations for purposes of activating the response organization.
- Operational intervention levels are included to implement protective and other response actions to protect the public and emergency workers, based in IAEA recommendations.

## Early warning - prognosis and response

## IAEA - National actions

### Latin American Biological Dosimetry Network (LBDNet)

- Cuba integrates the LBDNet with very active participation in the activities of this network.
- Provide assistance to the countries of the region devoid of biological dosimetry laboratory.
- Cooperates with the IAEA-IEC under the Conventions Emergency Other assistance systems such as the Global Laboratory Network Biosimetry (BioDoseNet) WHO.
- Supports inter-comparison exercises to maintain quality estándares Biosimetry, preparing and sending blood samples processed for cytogenetic analysis and discussing the results obtained by other laboratories in the network.
- Standardized procedures in accordance with ISO 19238 Standard and the document IAEA-EPR-Biosimetry 2011.
- Most laboratories have implemented biosimetry tools (dicentric assay is using LBDNet) and other techniques such as: Micronucleus cytokinesis blocking stone; FISH; PCC rings; gamma foci H<sub>2</sub>AX.
- Strengthen collaboration with laboratories in other countries in the region and other regions (j. IRSN, France, UAB, Spain), and regional networks (France, Canada connects a computer network, etc).

### Biological dosimetry

- National Environmental Radiation Monitoring Network (RNVRA) (52 points radiological measurements (18 active throughout the year and only 34 remain retracted emergency).
- Tools recommended by the IAEA.
- Contingency/emergency plans.

## CHALLENGES

- Completing a emergency management program in accordance with the requirements of GS-R-2.
- Development of sustainable strategies for training personnel to respond to radiological emergency situations caused by natural disasters, nuclear terrorism acts and medical response.
- Strengthening the technical capabilities of the network to provide biosimetry in different exposure scenarios.
- Strengthening and maintaining technical capabilities for detection and determination of concentration of radionuclides in environmental samples
- Ensuring the border controls for avoiding the illicit trafficking of nuclear and radioactive materials.

- 2012
  - Technical Missions INSSP.
  - National training course and exercise in EPR.
- 2013
  - National Workshop Preparedness and response a Radiological Emergency Response caused by natural disasters.
  - National Exercise Radiological Emergency Response caused by event security (CENTIS 2013).
  - Improvement of physical protection system at radiological sites in Cuba.

- 2014
  - Meeting CUBA - IAEA activities in the INSSP.
  - Regional training courses and workshops EPR.
  - Installation and acquisition of equipment for nuclear security architecture (ports, airports, installations with dangerous sources, Category I and II; hospitals) for primary detection and secondary inspection.

## CONCLUSIONS

- With the support of the IAEA and the participation of all organizations involved in the process of preparedness and response to radiation emergencies has an interim capacity for radiological emergency response.
- Main results:
  - Integrated approach to radiological emergency response planning, including natural disasters and nuclear security events, and
  - Strengthening Multi-institutional coordination.
- Cuba continues working in cooperation with the IAEA for implementing the requirements of GS-R-2 .